REMARKS

Claims 1-7 are pending in this application, of which claim 7 has been withdrawn from consideration and claims 1-6 have been amended. No new claims have been added.

The Examiner has objected to claims 3 and 6 for various informalities which have been corrected in the aforementioned amendments. The title and the preamble of claims 1-6 have been amended to be directed to a Gas Diffusion Layer Arrangement For a Fuel Cell, because claim 2 recites a second gas diffusion layer stacked to what must be a first gas diffusion layer, both of them forming a gas diffusion layer arrangement for a fuel cell.

Figs. 1, 2 and 6 have been corrected. Figs. 1(a) and 1(b) have been labeled separately; Figs. 2(a) and 2(b) have also been labeled separately; and Fig. 6 has been labeled as "Prior Art".

Claim 4 stands rejected under 35 USC §112, second paragraph, as indefinite.

Accordingly, claims 1-6 have been amended to correct the noted instances of indefiniteness, and the 35 USC §112, second paragraph, rejection should be withdrawn.

Claim 1 stands rejected under 35 USC §102(b) as anticipated by or, in the alternative, under 35 USC §103(a) as unpatentable over U.S. Patent 3,793,085 to Hino et al. (hereinafter "**Hino et al.**").

Applicants respectfully traverse this rejection.

Hino et al. discloses a gas diffusion electrode for a fuel cell in which a layer 202 consisting of carbon powder subjected to a water-repelling treatment surrounds an imbedded

nickel net layer 203. Figs. 3 and 4 of **Hino et al.** show the layer 202 is present on both sides of nickel net layer 203.

This is in contrast to the present invention, in which the mixture of electrically conductive powder and water repellant (22) is contained entirely within the voids of mesh sheet (2), as shown in Fig. 1.

Accordingly, claim 1 has been amended to recite this distinction.

It should be noted that in the cell structure recited in claim 1 of the instant application, the air electrode comprises at least one gas diffusion layer and an air electrode side catalyst layer and the fuel electrode comprises at least one gas diffusion layer and a fuel electrode side catalyst layer, wherein **an electrode reaction is carried out not at the gas diffusion layers, but at the catalyst layers**. In other words, a fuel electrode reaction is carried out at a fuel electrode side catalyst layer and an air electrode reaction is carried out at an air electrode side catalyst layer (see page 2, lines 14 to 24 of the specification). The first and second gas diffusion layers function to diffuse air and fuel to the fuel electrode side catalyst layer and the air electrode side catalyst layer, respectively.

The gas diffusion layer for the fuel cell recited in claim 1 of the instant application is excellent in gas permeability, water repellence or other, and has a remarkable effect of being able to supply the catalyst layer with reaction gas (air and fuel) by well diffusing, and at the same time, to discharge reaction produced water and removing water satisfactory. (See page 15, lines 4 to 8 of the specification).

Hino et al. discloses a gas diffusion electrode for a fuel call in which a layer (202) consisting of carbon powder and a binder thereof has a current collector (203) of a nickel net embedded therein (see claim 5 of Hino et al.). **Hino et al.** does not disclose the electrode consisting of a catalyst layer and at least one gas fusion layer, and in **Hino et al.**. **the layer (202) participates in an electrode reaction** (see claim 5 of **Hino et al.**).

The advantageous results of the present invention as recited in claim 1 are shown at page 15, lines 4 to 8, of the specification. Those results are different from those of **Hino et al.**

Thus, the 35 USC §102(b) rejection should be withdrawn.

Claims 2-4 stand rejected under 35 USC §103(a) as unpatentable over **Hino et al.** in view of Muranaka et al. (hereinafter "**Muranaka et al.**").

Applicants respectfully traverse this rejection.

Muranaka et al. has been cited for teaching a three-layer electrode [56] on which the outer gas diffusion layer [52] is desired to have a lower wettability compared to the layer adjacent the current collector [55], but neither of the cited references teaches either the limitations in claim 1, amended as proposed, from which these claims depend, or that the void rate of one layer is smaller than the other layer, as recited in claim 2 of the instant application.

It should be noted that in claims 2 to 4 of the instant application, a second gas diffusion layer is formed of the mixture of electrically conductive powder and water repellent filler.

The Examiner states: "**Hino et al.** teaches a second gas diffusion [305] stacked on the first gas diffusion layer [301] (Figure 5, line 5-13)" and "The first and second gas diffusion layers

are both made of the Neoflon polyflon paper, thus the second gas diffusion layer is formed of the mixture of electrically conductive carbon powder and water repellant".

However, the Examiner's assertions are not in conformity with the following description found in column 5, lines 5-14 of **Hino et al.**:

> An electrode of the present embodiment is shown in FIGS. 5 and 6 and a layer 305 consisting of powder of a fluorinated ethylene-propylene fluorocarbon resin, that is, "Neoflon", a polyflon paper 301 similar to that Embodiment IV, a layer 302 consisting of a mixture of activated carbon powder and fluorinated ethylene-propylene fluorocarbon resin powder, that is, "Neoflon", a current collector 303 in the form of a nickel net, and terminal 304.

If, according to the statement of the Examiner, the second gas diffusion layer is [305] and the first gas diffusion layer is [301], however, because the fluorinated ethylene-propylene fluorocarbon resin of [305] and the polyflon paper of [301] are not electrically conductive material, [301] and [305] can not be deemed to be the first and second gas diffusion layers which contain electrically conductive powder.

If Applicants could suppose that the Examiner intended to consider 302 as the first gas diffusion layer, the layers [301] and [305], which contain no electrically conductive powder, can not be deemed as the second gas diffusion layer, which contains electrically conductive powder.

In claim 2 of the instant application, the fuel cell has the arrangement of (air side) first gas diffusion layer/second gas diffusion layer/air side catalyst layer/electrolyte film/fuel side catalyst layer/second gas diffusion layer/first gas diffusion layer (fuel side), and a void rate of the second gas diffusion layer is smaller than that of the first gas diffusion layer, that is, the void rate of electrolyte side is smaller.

The Examiner states the **Muranaka et al.** teaches a three-layered electrode [56] on which the outer gas diffusion layer [52] is desired to have a lower wettability compared to the layer adjacent the current collector [55]. However, the layers [52]-[54] are catalyst layers (col. 8, line 20) and the catalyst layer has a gradient in water repellence across the thickness of the electrode that the water repellence is highest (highest void rate) in the area adjacent to the electrolyte membrane and lowest (lowest void rate) in the area adjacent to the conductor (dol. 10, lines 33-37 of **Muranaka et al.**). That is to say the highest void rate is on the electrolyte side. In contrast, in the present invention the void rate of electrolyte side is smaller and catalyst layers do not have such a gradient.

Therefore, **Muranaka et al.** does not disclose the features of claim 2 of the instant application.

The advantageous results obtained by claims 2 to 4 are shown at page 15, line 9 to page 16, line 4, of the specification. Those results are different from those of **Hino et al.** and **Muranaka et al.**

Thus, the 35 USC §103(a) rejection should be withdrawn.

Claims 5 and 6 under 35 USC §103(a) as unpatentable over **Hino et al.** in view of U.S. Patent 4,301,218 to Benczur-ürmössy (hereinafter "**Benczur-ürmössy**").

Applicants respectfully traverse this rejection.

The Examiner has cited **Benczur-ürmössy** for teaching a second gas diffusion layer [1] having a thickness smaller than a first gas diffusion layer [3], in which the surface area of the first gas diffusion layer is smaller than that of the second gas diffusion layer.

Applicants respectfully disagree. Column 3, lines 1-17, cited by the Examiner, discloses neither the surface area nor the thickness of either the gas transport layer 1 or the working layer 4.

It should be noted that **Benczur-ürmössy** relates to a bi-porous electrode, including at least one conducting first layer having relatively large pores and at least one conducting second layer having relatively small pores to face a counter electrode in a cell, and containing Raney-nickel (see claim 1). The gas transport layer 1 have large pores and fibers 2, and all the space 3 between the fibers serves for transporting gas. The working layer 4 includes the fibers 2 of the substrate as well as the catalyst grains 5 (col. 3, lines 13-15). **Benczur-ürmössy**, however, does not disclose the first and second gas diffusion layers containing a electrically conductive powder and water repellent filler.

In the present invention, the gas diffusion layers do not comprise a catalyst.

The advantageous results obtained by claims 5 and 6 are shown at page 16, line 5 to page 19 of the specification. These results are different from those of **Benczur-ürmössy**.

Thus, the 35 USC §103(a) rejection should be withdrawn.

In view of the aforementioned amendments and accompanying remarks, claims 1-6, as amended, are in condition for allowance, which action, at an early date, is requested.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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IN THE DRAWINGS:

Figs. 1(a), 1(b), 2(a), 2(b) and 6 have been amended. Replacement sheets are attached for Figs. 1(a), 1(b), 2(a), 2(b) and 6.